

teristics of the age. By 300 B.C. the Greeks had lost much of their manly vigour and intellectual strength."

In seeking for a cause for so remarkable a change the pregnant suggestion was made by Major Ross that widespread disease—particularly those "endemic diseases, which when introduced oppress a country for ever"—may have had far-reaching effects in modifying and moulding a new national character. Thus, in many of the southern States of America, the ill-health produced by widespread infection with the hook-worm has been held by American parasitologists to be largely responsible for the sloth and want of enterprise exhibited by the inhabitants of those districts. Recent investigations into the prevalence of malaria in Greece by Major Ross and others suggest that this disease may have been introduced into the country during the period mentioned, and may have been the factor bringing about this remarkable alteration of national characteristics. For malaria has not necessarily always been endemic in the districts in which it is now found. For example, Mauritius was free from malaria up to 1866, in which year it was introduced, and has caused infinite injury to the island ever since.

Mr. Jones has sought in the ancient authors for evidence which may serve to show when malaria was introduced into Greece, and what its effects may have been on the race, and has embodied the results of his researches in this interesting book. With two exceptions there seem to be no references in the classic writers to any disease which could be malaria before the middle of the fifth century B.C. It is in the "Wasps of Aristophanes" (422 B.C.) that the word *πυρετός* (used, generally in the plural, for malaria) first occurs in Greek literature (with a single exception in the "Iliad"). It is a singular coincidence that three years previously the Athenians were engaged on the island of Sphacteria, which is now one of the most malarial centres in the Mediterranean. The Peloponnesian war followed, large tracts of land were allowed to go out of cultivation, and it seems not unreasonable to conclude that the malaria parasites, introduced from Italy by Greek slaves or perhaps by the Carthaginians, then spread gradually over the country.

The word *μελαγχολία* and its cognates occur in Greek literature soon after the word *πυρετός* became common. Now the primary meaning of "melancholy" (derived from *μέλαινα χολή*, "black bile") seems to have been "excitable" or nervous. In the medical writers, tertian and quartan fevers were said to be derived from yellow and black bile respectively. Galen says that "large spleens are caused by 'melancholy humour'" (humour being used in the sense of a morbid fluid), and Hippocrates remarks that cases of "melancholy" occur in the autumn, which is the malarial season. It would therefore seem that the "melancholy" of these early writers is malarial cachexia. Mr. Jones arrives at the conclusion that "malaria was certainly prevalent in many parts of Greece, including Attica, during the fourth century B.C., though Greece was not 'highly infected,'" and

that "the change which gradually came over the Greek character from 400 B.C. onwards, was one which would certainly have been aided, and was in all probability at least partially caused by the same disease."

In a similar manner the introduction of malaria into Italy is discussed, and it is inferred that this disease did not exist there much before 200 B.C., but was prevalent from 50 B.C. onwards. It seems plausible that it was introduced by Hannibal's Carthaginian mercenaries. As in Greece, so in Rome, it left its mark on the national character:—"Malaria made the Greek weak and inefficient; it turned the sterner Roman into a blood-thirsty brute—*atra bilis* made its victims mad."

Mr. G. Ellett contributes a final chapter, and among other points directs attention to the immunity from malaria enjoyed by progressive Japan contrasted with her stagnant neighbour China, where malaria is prevalent. Major Ross's foreword describes the manner in which malaria is disseminated by the mosquito, and some of the results of malarial infection, and serves as a fitting introduction to this interesting essay, particularly for the non-medical reader. Besides being interesting, the book has been issued with an object—to show how important it is to stamp out malaria wherever possible.

R. T. II.

ELECTRICITY OLD AND NEW.

Cours d'Électricité. By H. Pellat. 3 vols. Vol. i., pp. vi+329; price 10 francs. Vol. ii., pp. 554; price 18 francs. Vol. iii., pp. vi+290; price 10 francs. (Paris: Gauthier-Villars, 1901, 1903, 1908.)

Les Découvertes modernes en Physique. By O. Manville. Pp. iii+186. (Paris: A. Hermann, 1908.) Price 5 francs.

M. PELLAT has published the courses of lectures which he gave from 1898 to 1907, covering the whole science of electricity. The first volume deals with electrostatics, the second with currents and magnetism, the third with the later developments of electrolysis and gaseous conduction. The course is intended and suited for somewhat advanced students, and no limitations are placed upon the use of mathematics; for the most part, little attention is given to experimental arrangements.

In the case of a work by a physicist so distinguished as M. Pellat it is unnecessary to criticise details; accuracy and soundness in all essentials may be assumed. The only remarks which a reviewer can offer concern the method of treatment; and it is in this respect that M. Pellat's volumes call for comment, for the order in which the subject-matter is introduced is entirely unconventional. The author believes that the usual development is illogical, and has endeavoured to correct this fault.

Thus he refuses to develop electrostatics from the basis of Coulomb's law on the ground that, if that law is taken as the starting-point, some hypothesis must be introduced, when media of different dielectric constant are considered. Accordingly he starts from experiments with a Faraday cylinder and an electrometer, and only introduces Gauss's theorem and the

law of the inverse square after he has established almost all the important propositions. But any given proposition can only be established validly by any process of argument from an irreducible number of primary propositions or assumptions. If the assumption of which M. Pellat speaks is necessary to the development of the subject, then, if his arguments are sound, that assumption or its equivalent must be introduced at some stage. The difference between M. Pellat's treatment and that adopted ordinarily is not that the former requires fewer primary propositions than the latter, but that in the former those propositions are introduced as the direct consequence of some experiment, while in the latter they are introduced as hypotheses verified subsequently by the agreement of deductions from them with experiment. Now we insist most strongly that it is the latter process which is the more logical, for it is the process by which experimental sciences are actually developed. It is perniciously misleading to attempt to apply to such sciences arguments of the kind used in pure mathematics, for it is impossible to deduce any mathematical conclusion whatever from any experiment without an hypothesis; there is always an error of experiment. In our opinion, there are only two methods by which a science may be developed logically, neither of which is adopted by M. Pellat. The first is to follow the historical development, pointing out the stages at which hypotheses are introduced; the second is to define at the outset the concepts used and the propositions relating them, and to show that these lead to conclusions in harmony with experiment.

M. Pellat also prefers to develop electrodynamics directly from the mutual action of currents, introducing the concept of magnetism as a subsidiary function, and then applying it to the phenomena of magnetic substances. His reason for this unconventional procedure is that magnetism is a fictitious quantity which does not exist, but only behaves as if it existed—a distinction too subtle for our comprehension. But here surely the author is abandoning his logical principles. Magnetism is only introduced into the study of current actions because the properties of permanent magnets happened to be examined before those of currents; if the historical order had been reversed, there would have been no need for the conception. If the author is ready to brave all the inconveniences that attend the ignorance of the history of the subject for the sake of logic, surely consistency to his scheme should make him abandon a notion so purely historical as magnetism.

Remark should also be made on M. Pellat's strange neglect of Maxwell's theory of the electromagnetic field. A complete description is given of Hertz's experiments on electric waves, but the theory on which alone they are intelligible is relegated to a few pages in an appended note. Rowland's fundamental research, proving the identity of the electrostatic and electromagnetic conceptions of a current, is referred to in a brief phrase and attributed to Röntgen and Hertz. In some other places the work shows a lack of proportion in the space that is given to different

subjects; twenty pages on electrostatic generators seems excessive, but on the other hand the chapter on dynamos and motors is excellent, and contains much that is too often excluded from physical textbooks. The last volume is on a somewhat different plane from its predecessors; it is more advanced, and contains discussions of many controversial points. We welcome an excellent last chapter on the elements of gaseous conduction.

It must not be thought that our remarks imply any disparagement of the work as a treatise for students; criticism has only been directed where it is challenged. English students are not so well provided in this subject that they would not welcome a translation. There is only one really serious defect in the book in its present form—the absence of an index.

M. Manville's book may be regarded in some respects as an attempt to supplement that of M. Pellat. The author complains that his countrymen have not realised yet the importance of the latest physical research. He thinks that they may have been hindered by the absence of a suitable summary which renders unnecessary reference to original memoirs, and has set himself to supply the defect. In less than 200 pages he treats of cathode and Röntgen rays, ionisation of gases, radio-activity, and general electron theory. Two subjects are also introduced which can hardly be termed modern; we should have thought that his exposition of the simple facts of electrolysis might have made way for more valuable matter, but apparently he is right in assuming that Maxwell's work has not been assimilated by those for whom he writes.

M. Manville's project is admirable, but we fear that his powers are not equal to his intentions, for he himself has not mastered these subjects completely. There are several actual mistakes, but a still more serious fault is to be found in his failure to show the connection between many of the phenomena which he describes. Though the various methods by which a gas may be rendered a conductor are treated in some detail, the only reference to the modern theory of ionisation, by which these methods may be correlated, is contained in a brief and inadequate paragraph at the end of the chapter. The account of the cathode rays is satisfactory, but there is no reference to the mechanism of the electric discharge in which they have their origin, nor is any distinction made between the electron and the ion which it forms. The chapter on radio-activity is a list of unconnected facts, while the theory of Rutherford and Soddy is dismissed as insufficient for the strange reason that it gives no account of induced activity! If not more than six pages could be spared for the application of the electron theory to optics, conduction and chemistry, it would have been better to leave such matters unmentioned. In view of recent speculations on the density and rigidity of the æther, it is hardly judicious to describe that medium as "ultra-gaseux."

As an example of actual inaccuracy we may quote the statement that solid dielectrics are ionised by Röntgen rays in the same way as gases. Our confidence in the author's analysis is shaken severely by

a calculation on p. 67, where the maximum current obtainable between two electrodes of constant potential difference, but variable distance, is deduced from the condition that the differential coefficient of the current with respect to the *time* should be zero.

French books are apt to err in matters of typography, but such an abundance of misprints and misspellings cannot be left unnoticed; Prof. Townsend comes in for specially hard treatment. On the other hand, we are accustomed to expect French authors to redeem these deficiencies by a graceful literary style; but M. Manville's aberrations would be hardly tolerated in England. It is with great regret that we have to express our opinion that a design contemplated so wisely should remain still in need of successful execution. N. R. C.

OUR BOOK SHELF.

The Oceanic Languages: their Grammatical Structure, Vocabulary, and Origin. By Dr. D. Macdonald. Pp. xv+352. (London: Henry Frowde, 1907.) Price 10s. 6d. net.

In this volume, Dr. Macdonald sets forth the proposition that the Oceanic languages originated in the Arabian peninsula, and are thus cognate with the Semitic tongues. The primitive Oceanic he regards as a sister language of Arabic, Himyaritic, Ethiopic, Assyrian, Phœnician, Hebrew, and Aramaic, and Efate, Samoan, Malagasy, Malay, &c., as cousins of the modern Semitic dialects. He regards the people speaking the Oceanic languages in Madagascar, the Malay Archipelago, Melanesia, and Polynesia as one great, though diversified, race or people, and the languages themselves as constituting one great family. This unity of race is, however, negated by the known ethnological data.

Although entitled "The Oceanic Languages," the work is mainly a dictionary of the Efate language of the New Hebrides, preceded by a discussion on the phonology, trilateralism, word-building, pronouns, and particles of the same language. These grammatical elements are compared with those of the Semitic languages taken collectively, so as to show a correspondence of forms. There is no attempt to give a comparative grammar of the Oceanic languages, though some few languages of the region, mainly Malagasy, Malay, other New Hebrides dialects, and Polynesian, are dealt with partially. In the absence of a comparative treatment of the Oceanic languages, some statements, such as those relating to the loss of gender in Oceanic pronouns (p. 75), the modern use of plural pronouns for singular, the representation of the Semitic nunation by final *na* or *n* in Malagasy and Malay (p. 92), are open to doubt, and cannot be accepted without some adequate proof being given.

The work is well printed, but it would have been better to print all the Semitic words in Roman character instead of occasionally using the Ethiopic, Syriac, Arabic, or Hebrew characters without transcription. In the preliminary (grammatical) part of the book there is a large amount of cross-reference, by which the illustration of some statement has to be sought in hundreds of places in the body of the book. In the dictionary, comparison of the Efate words is more fully made with the Semitic than with the Oceanic tongues, and here there are also numerous cross-references.

In conclusion, it may be said that the similarity of form in words and particles which Dr. Macdonald

has shown in Efate and Semitic is no proof that they were originally the same, and exactly the same method has been employed to affirm the relationship of the Oceanic languages to Aryan, Australian, and American. The history of the Oceanic languages, as a whole, must be traced out before the apparent affinities of one of them can be held to establish a relationship of the whole group to some other linguistic group. S. H. R.

Searchlights: their Theory, Construction, and Application. By F. Nerz. Translated by Charles Rogers. Pp. vii+137. (London: Archibald Constable and Co., Ltd., 1907.) Price 7s. 6d. net.

THE use of searchlights has rapidly extended during recent years, with the result that the want of a good treatise, dealing with their principles of construction and the methods of using them, has made itself acutely felt. The volume at present under review is a translation of the treatise on searchlights in Prof. Voit's "Sammlung elektrotechnische Vorträge," but much new matter has been added, so that it now forms an epitome of the latest practice. After dealing with the optical principles utilised in the construction of searchlights, special attention being paid to parabolic mirrors, the performance of searchlights and the methods of testing their mirrors are discussed. The applications of searchlights in the field, in land fortresses, for coast defence, and on battleships then receive attention. For field purposes a light equipment is now obtainable, consisting of a waggon carrying a petrol motor and a dynamo, coupled to another waggon which carries the searchlight and a transportable tower for elevating it. Searchlight equipments for fortresses may be either fixed, partially movable, or wholly movable; each type receives adequate consideration.

For coast defence, special arrangements, such as dispersers, are sometimes required, and these, in their turn, necessitate special protecting devices. Searchlights are indispensable to a battleship; without their aid a night attack of torpedo boats could not be repelled, hence the application of searchlights to naval purposes receives very careful consideration. The details of construction are then described and illustrated, attention being paid to the different forms of arc lamp, their method of control, and the various optical accessories which form part of a complete equipment. The scientific principles utilised are so carefully and lucidly explained that they will be readily understood by one who has previously had little acquaintance with them. Various forms of transportable power supply are described and illustrated in the last chapter, and the book ends with an appendix which briefly describes the physical units used in photometry. No book could meet the want which led to its compilation better than this one does. E. E.

Beyond Good and Evil. Prelude to a Philosophy of the Future. By Friedrich Nietzsche. Authorised translation by Helen Zimmern. Pp. xv+268. (Edinburgh and London: T. N. Foulis, 1907.) Price 5s. net.

"ALL prudent, worldly wise men follow more or less approximately the practice which Nietzsche teaches, notwithstanding the opposite principles which they perhaps profess to hold," says Mr. Thomas Common in an introduction to this translation, and it will interest and instruct those who are unfamiliar with Nietzsche's philosophy to read what the philosopher has to say here on the natural history of morals and other subjects. No reader will complain that there are not questions enough for thought raised.